MULTIMEDIA UNIVERSITY

STUDENT IDENTIFICATION NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2019/2020

BBM3034 – BUSINESS MODELLING AND SIMULATION

(All section/Group)

12 MARCH 2020
9.00 am to 11.00 am
(2 hours)

INSTRUCTION TO STUDENT

1. This question paper consists of **THREE (3)** pages, excluding the cover page, with **FOUR (4)** structured questions.
2. Marks are shown at the end of each question.
3. Set up Question 2's production model in Worksheet 1. **Attach your answer in Worksheet 1 to the answer booklet.**
4. Write all your answers in the answer booklet provided.

Answer all questions.

Question One

(a) Explain why ***business analytics*** is important in today's world of business. (4 marks)

(b) One of the seven steps of modelling cycle is model building. Relate the three types of business models. (9 marks)

(c) Explain with appropriate examples about categorical variables used in a model. (9 marks)

(d) Evaluate the following statement, "***Spreadsheet simulations cannot be performed entirely with the built-in or add-in tools in Excel®***". (3 marks)

(Total: 25 marks)

Question Two

Company A must meet (on time) the following demands: quarter 1, 3000 units; quarter 2, 2000 units; quarter 3, 4000 units. Each quarter, up to 2700 units can be produced with regular-time labor, at a cost of RM40 per unit. During each quarter, an unlimited number of units can be produced with overtime labor, at a cost of RM60 per unit. Of all units produced, 20% are unsuitable and cannot be used to meet demand. Also, at the end of each quarter, 10% of all units on hand spoil and cannot be use used to meet any future demands. After each quarter's demand is satisfied and spoilage is accounted for, a cost of RM15 per unit is assessed against the quarter's ending inventory.

Supposed that the optimised solution for regular production in quarter 1 is 2,500 units; quarter 2 is 2700 units; quarter 3 is 2,700 units. Only 2,120 units are produced in quarter 3 using overtime production.

Based on the information on Company A, answer the following questions:

(a) Compute Company A's regular production cost, overtime production cost and holding cost. (6 marks)

(b) Set up Company A's problem on Worksheet 1 (in page 3). In Worksheet 1, determine the total cost minimisation for Company A. ***Attach Worksheet 1 to your answer booklet.*** (12 marks)

(c) Table 1 shows an extract of allowable increase and decrease for quarter 1 production (inventory + regular + overtime). If additional 100 units are produced, how would this decision affect Company A's cost of production? (3 marks)

Table 1 : Quarter 1 Production

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
Quarter 1	Onhand after production <=	3000	11	3000	160	160

(d) Explain why the analysis in (c) is useful. (4 marks)

(Total: 25 marks)

Continued ...

Question Three

(a) I am trying to determine how to allocate my investment portfolio between fixed deposits, stocks and bonds. Describe a simple simulation model to help me allocate my investment funds between fixed deposits, stocks and bonds over a ten-year planning horizon to yield an annual expected return of at least 8 percent and minimise my risk. (13 marks)

(b) Explain why simulation is known as a controlled experiment. (12 marks)

(Total: 25 marks)

Question Four

Triple-star, a publisher, must decide how many copies of the new edition of its Business Analytics textbook to print. Each book cost RM35 to print and can sell for RM53. Triple-star does not want to publish any e-book version due to high possibility of piracy. Triple-star believes that the number of Business Analytics textbooks can sell follows a normal probability distribution with mean 2,000 books.

The probability of demand for 1,000 books is 0.3, 1,500 books is 0.2, 2,000 books is 0.3, 2,500 books is 0.15 and 3,000 books is 0.05. Based on the probability distribution of demand, the discrete distribution with five possible values of 1,000, 1,500, 2,000, 2,500 and 3,000 are computed prior to a 1,000 simulation iteration. The summary of the simulation results developed by Triple-Star is presented in Table 2.

Table 2 : Triple-Star simulation

	A	B	C	D	E	F
4	Cost data					
5	Unit cost	$35.00				
6	Unit price	$53.00				
7						
8	Order quantity	2000				
9						
10	Summary measures of simulated profits for each order quantity					
11		Order quantity				
12		1000	1500	2000	2500	3000
13	Average profit	$30,060.00	$30,240.00	$30,060.00	$31,140.00	$30,780.00
14	Stdev profit	$12,007.50	$10,873.22	$10,383.29	$10,941.42	$10,923.28
15						
19	Simulation	Order quantity				
20	$27,000.00	1000	1500	2000	2500	3000
21	1	$27,000	$45,000	$27,000	$45,000	$27,000
22	2	$18,000	$36,000	$27,000	$36,000	$18,000
1018	998	$18,000	$27,000	$36,000	$18,000	$36,000
1019	999	$36,000	$18,000	$18,000	$27,000	$54,000
1020	1000	$18,000	$36,000	$18,000	$36,000	$36,000

(a) Explain how you would set up the probability of demand for the Business Analytics textbooks as a decision-making tool to solve Triple-Star's problem. (5 marks)

(b) Compute the deterministic model if the probability of demand is 0.8126. (4 marks)

(c) Infer how Triple-Star would apply Monte Carlo simulation as a decision-making tool to help solve its publishing problem. (10 marks)

(d) Explain how Triple-Star could validate its model developed above. (6 marks)

(Total : 25 marks)

Continued ...

Student ID No :- _____

Worksheet 1

	A	B	C	D	E	F
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

End of Page